UMCA 2010 Education Series

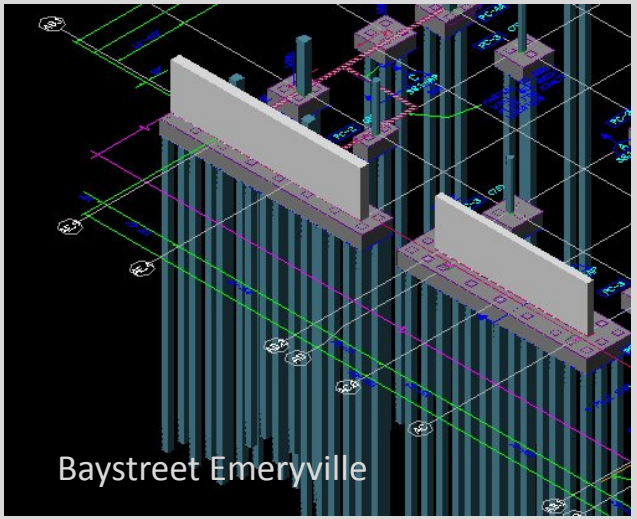
BUILDING INFORMATION MODELING

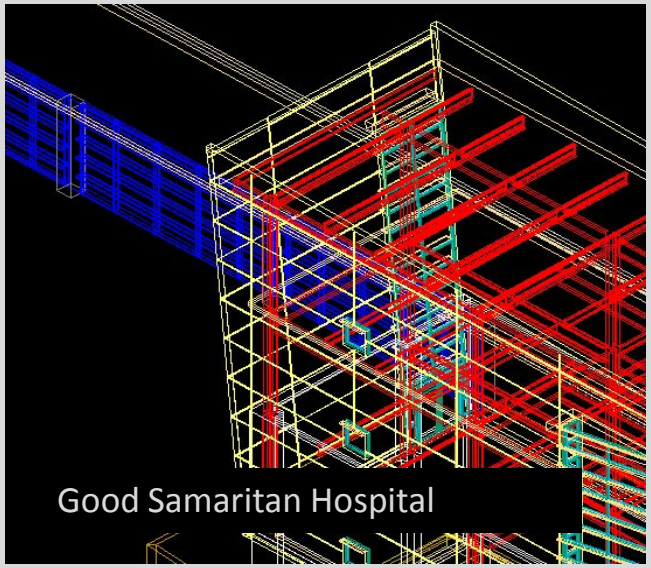
Little America Hotel
500 South Main Street
Salt Lake CIty, Utah
Thursday, January 28, 2010
12:00 pm – 2:00 pm

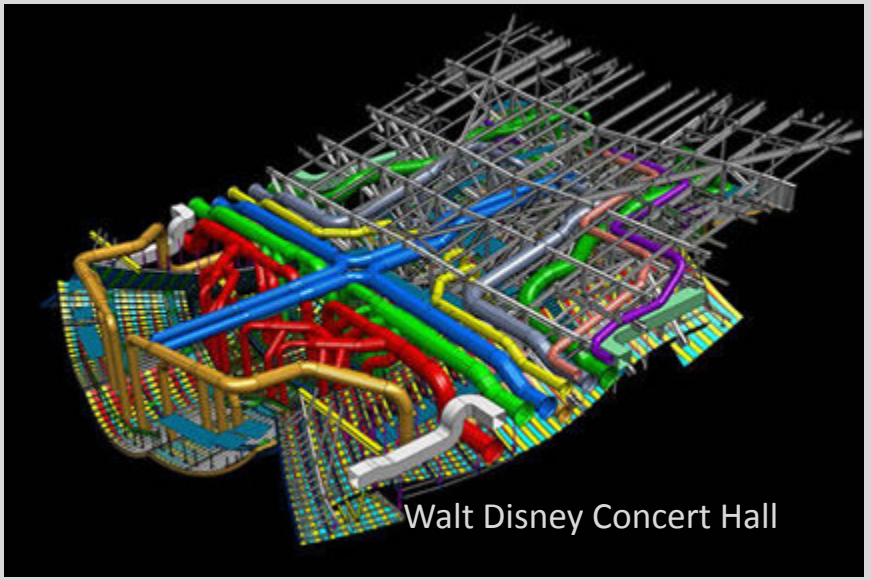
Intro

May Construction Services is a Virtual Design and Construction technology shop. BIM, Clash Detection, 3D Parametric Shop Drawings, Coordination Drawings, Design and Technology Research are just a few of our passions.

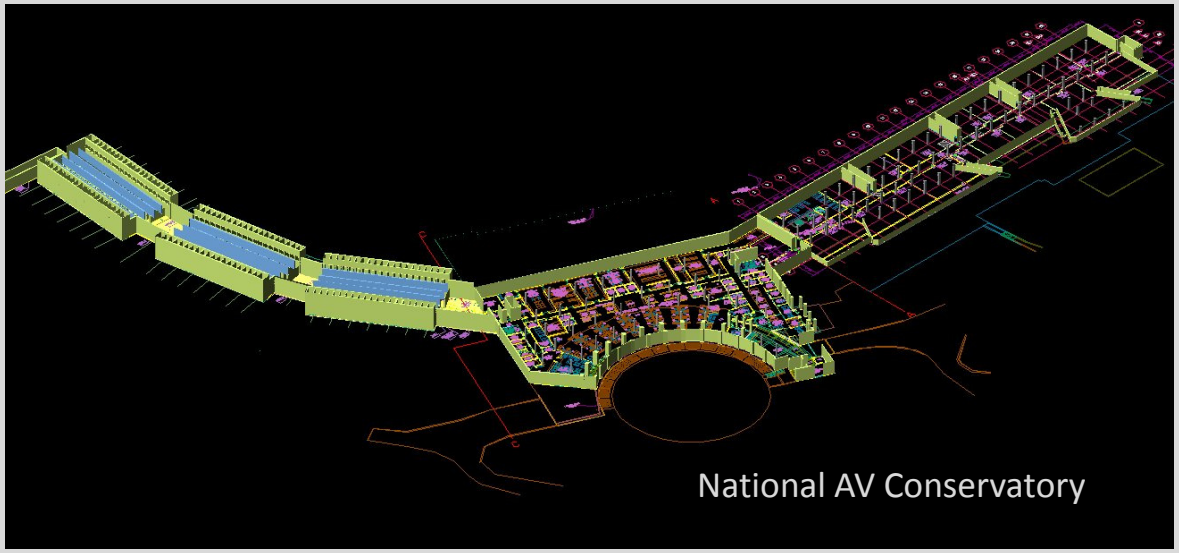
Snap Shots of Projects

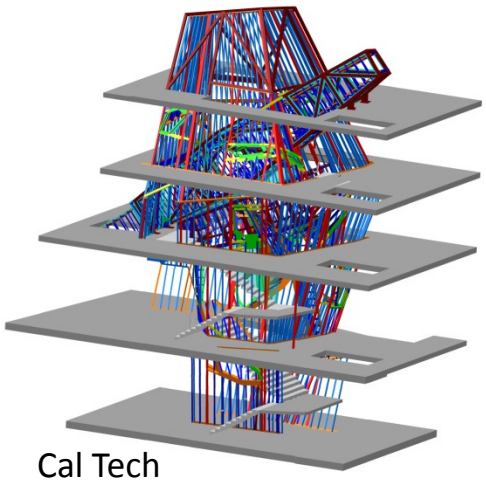






Snap Shots of Projects


National AV Conservatory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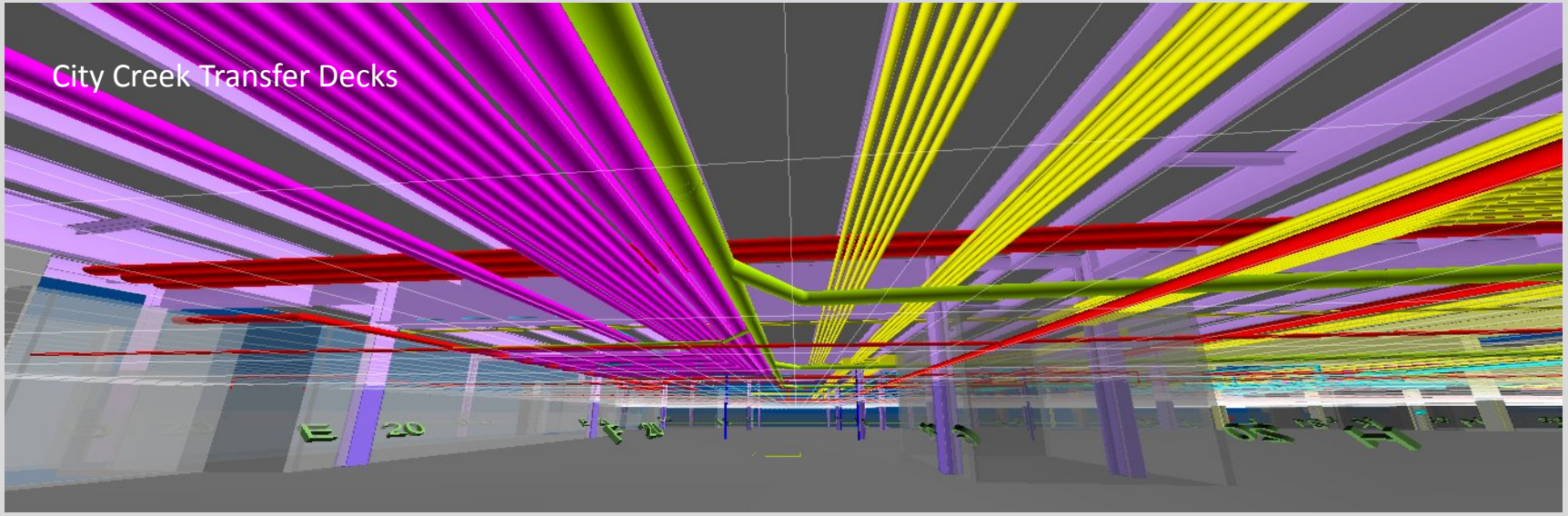
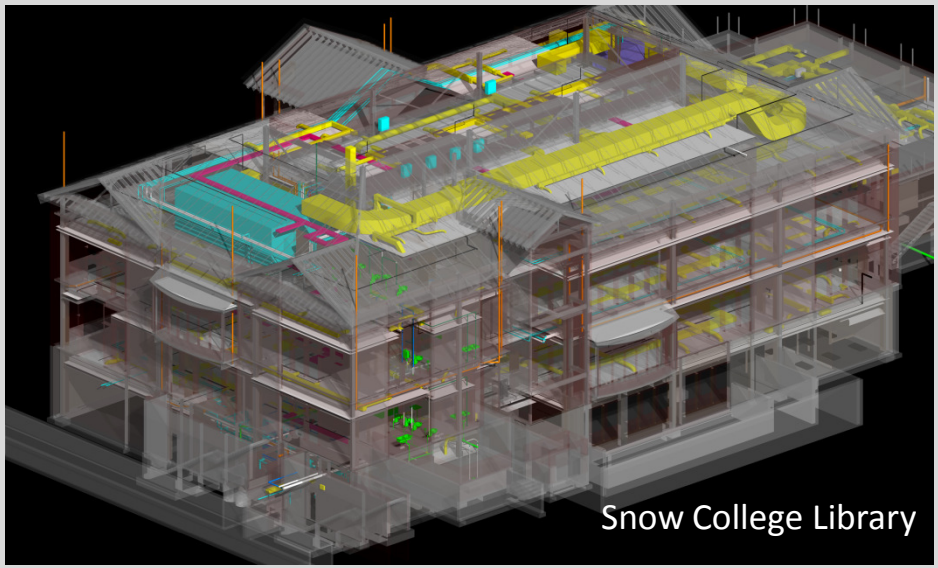
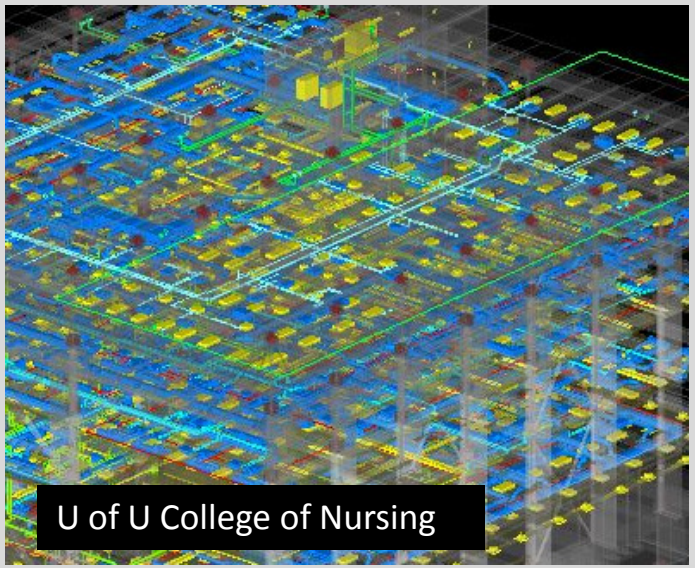
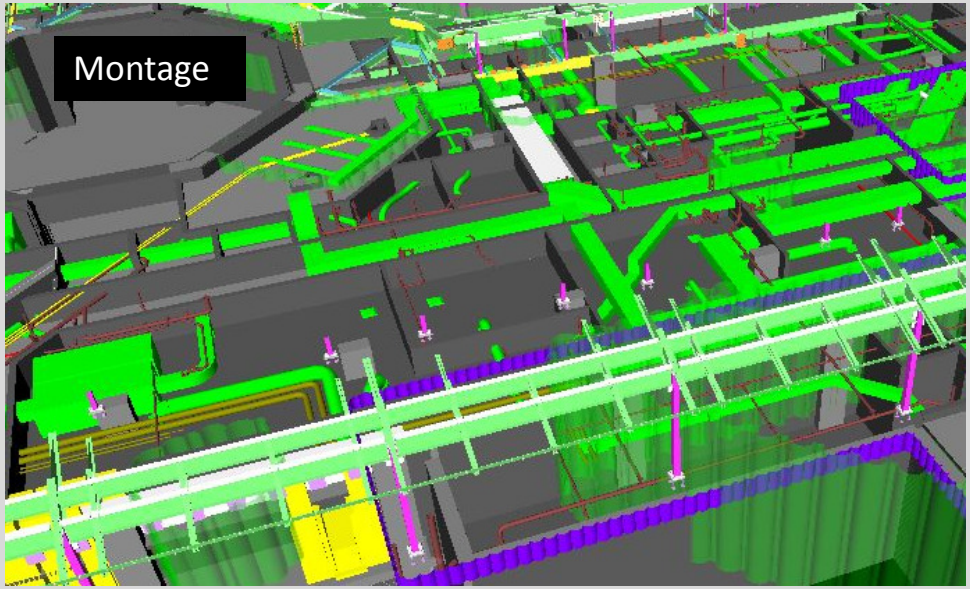
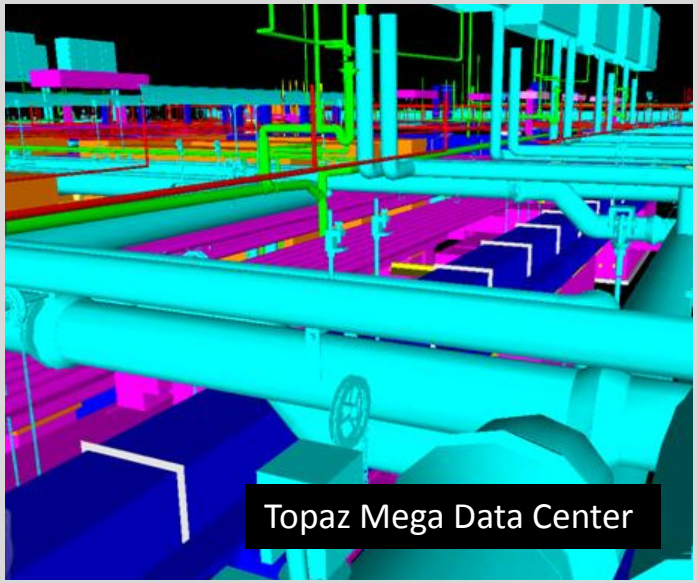

City Creek Transfer Decks

Snap Shots of Projects


Snow College Library


U of U College of Nursing


Montage


Topaz Mega Data Center

History

Est. in 1995

- 3D Modeling Consultant using Pro/Engineer
  - CM/GC Consulting using Pro/E, CATIA, CommonPoint
  - Worked on BIM projects at Bechtel, M.A. Mortenson, DPR

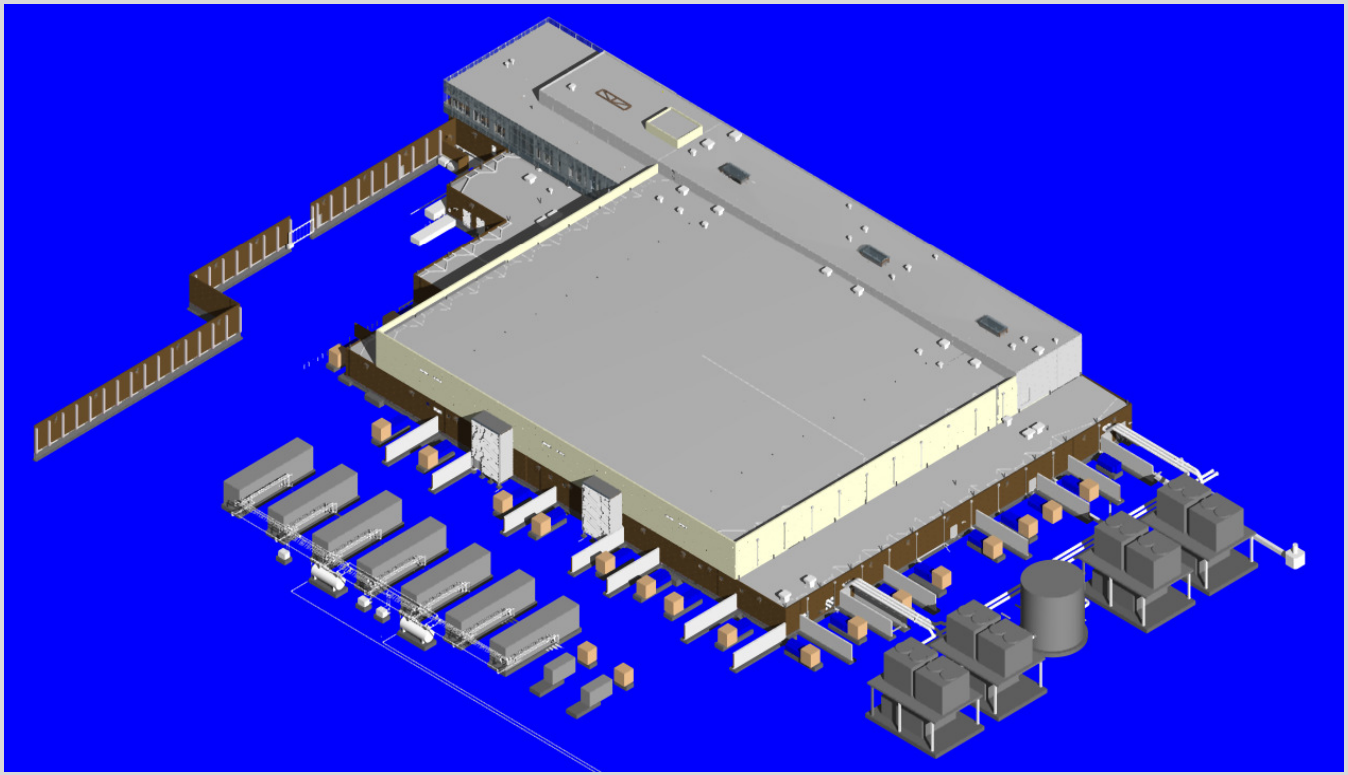
Current Snapshot

- Full BIM Services and Consulting Office Based in Provo
  - Total BIM Team of six Project Managers and Project Engineers
  - 20 Subcontracted 3D Modeling Experts in the Salt Lake Area
  - 15 Current BIM Projects
  - Any 3D/4D/5D Modeling Effort or Software Application
  - Commercial Construction Background with Advanced 3D Expertise

Case Study: Topaz

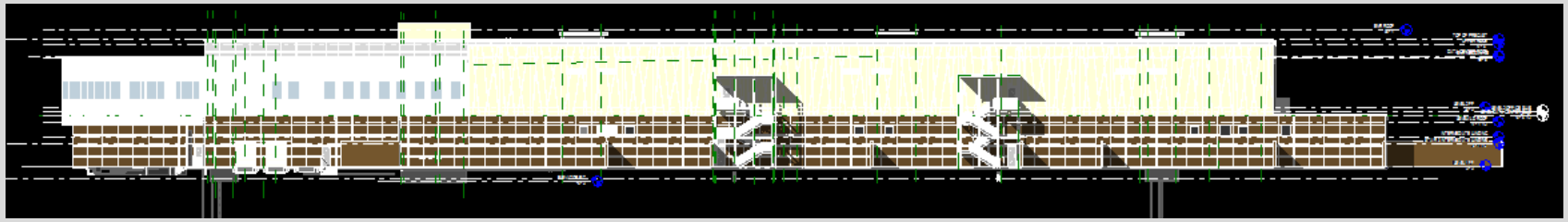
250,000 SF Data Center

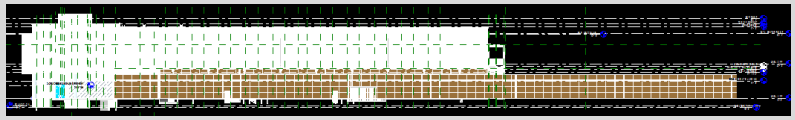
South Jordan, Utah
200-300 M Class Project

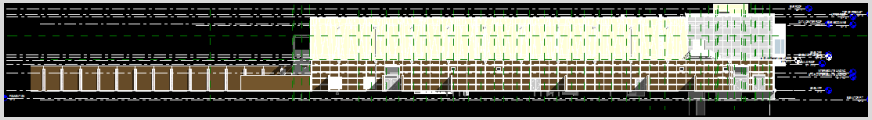


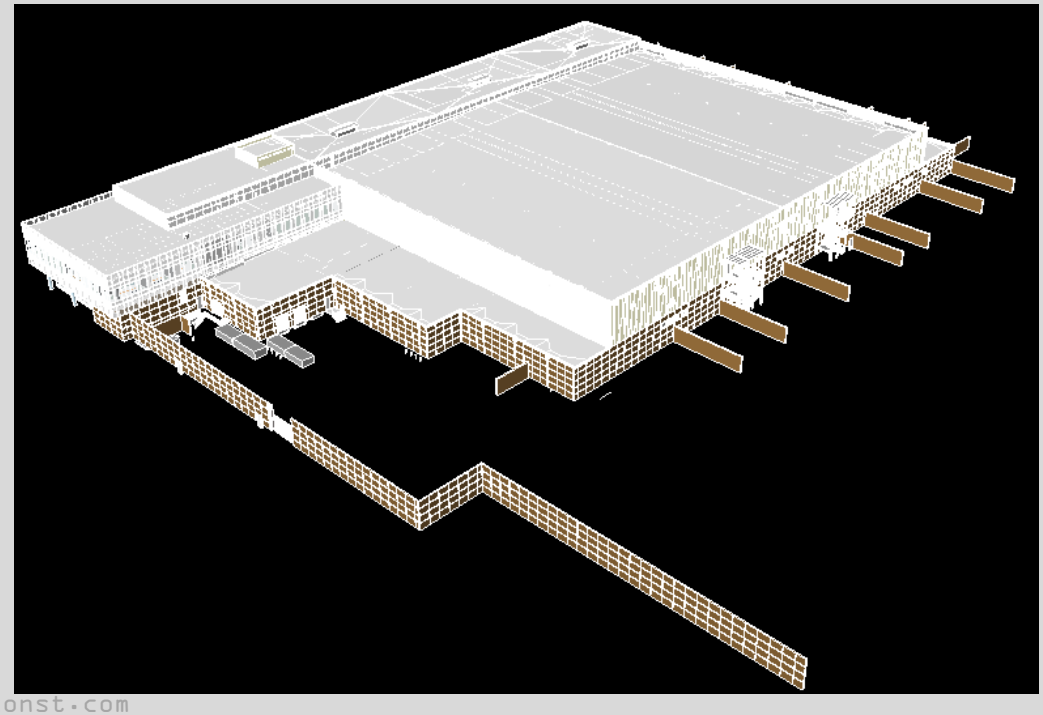
How BIM was applied

Full 3D Revit Design









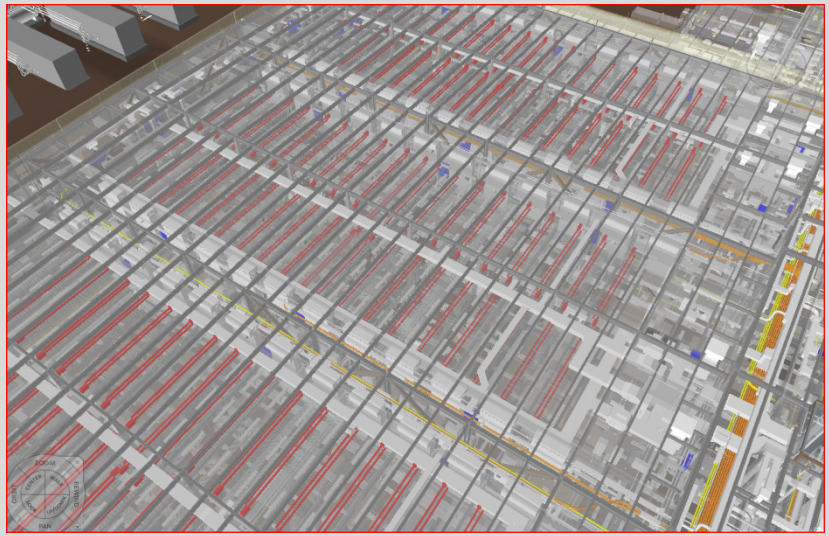
AE Team will have a separate set of BIM applications. For this Presentation we'll focus on Two of the Construction Aspects of BIM.

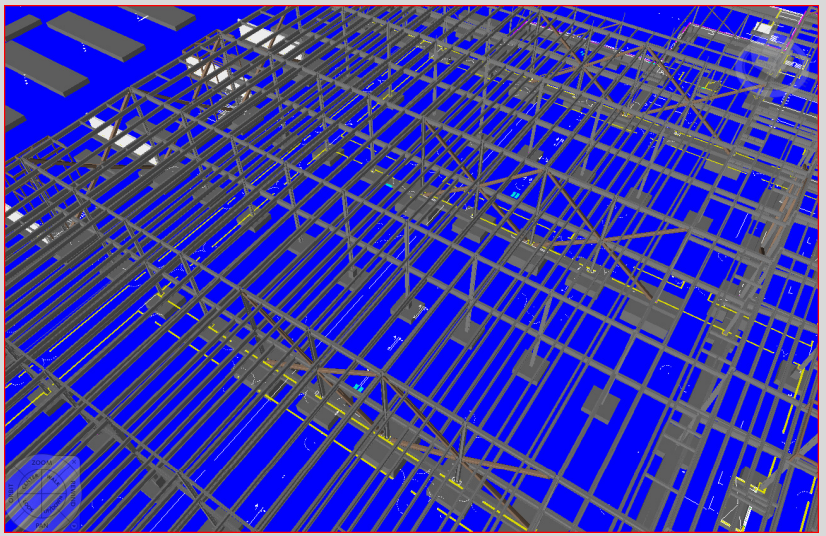
1- MEP Coordination

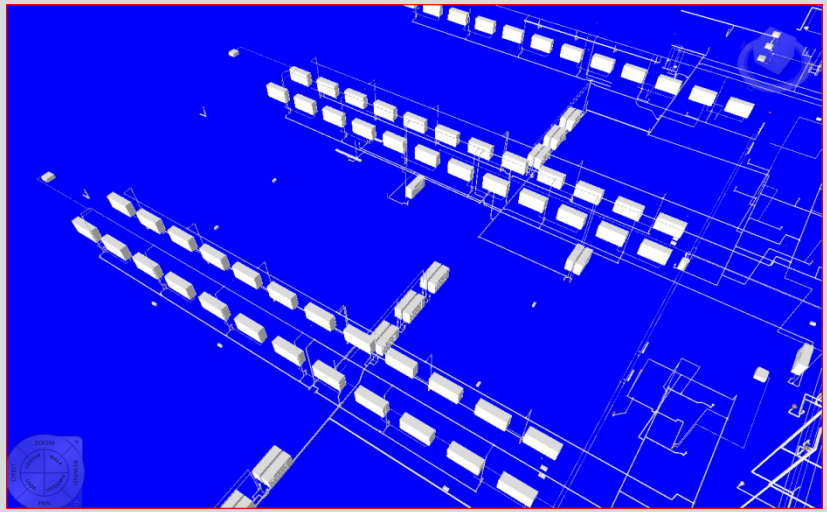
2- Field BIM

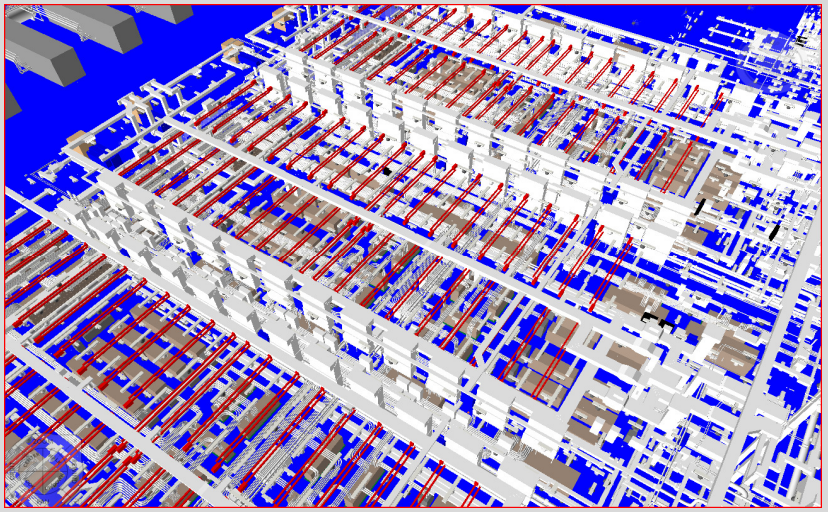
Full 3D Baseline Design from AE Group (Level 300 Models)

Structure, MEP, Interiors in 3D



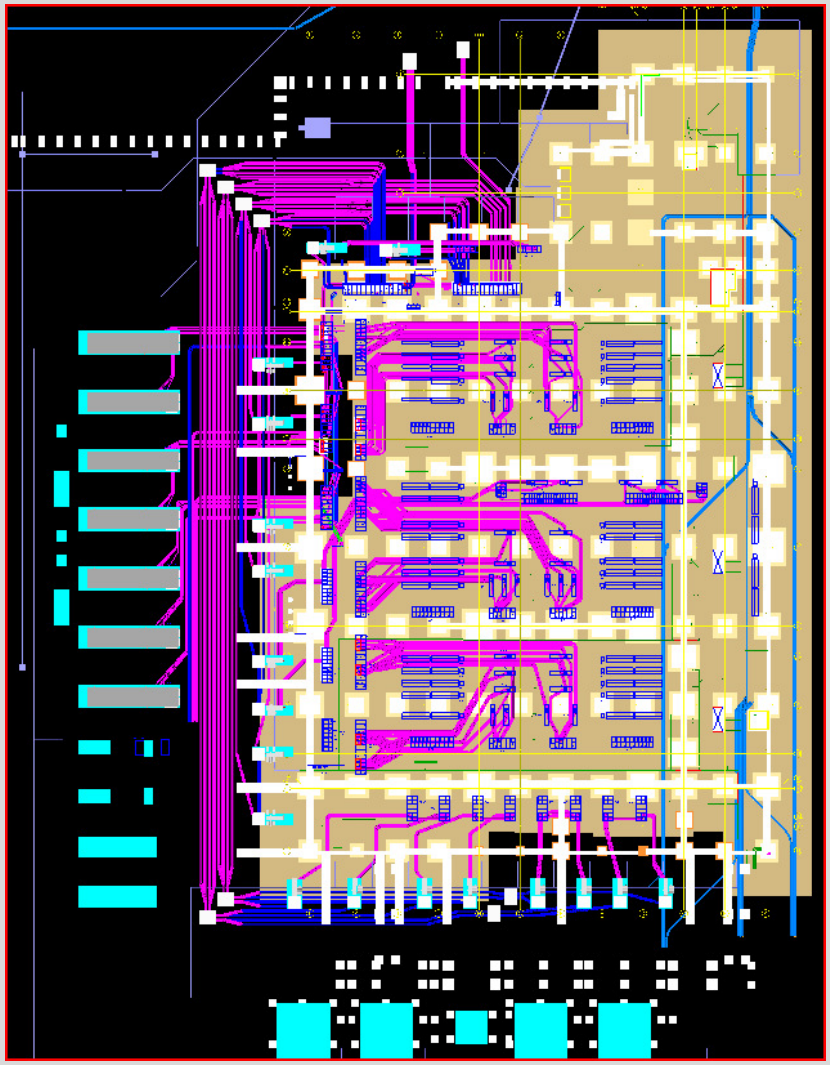


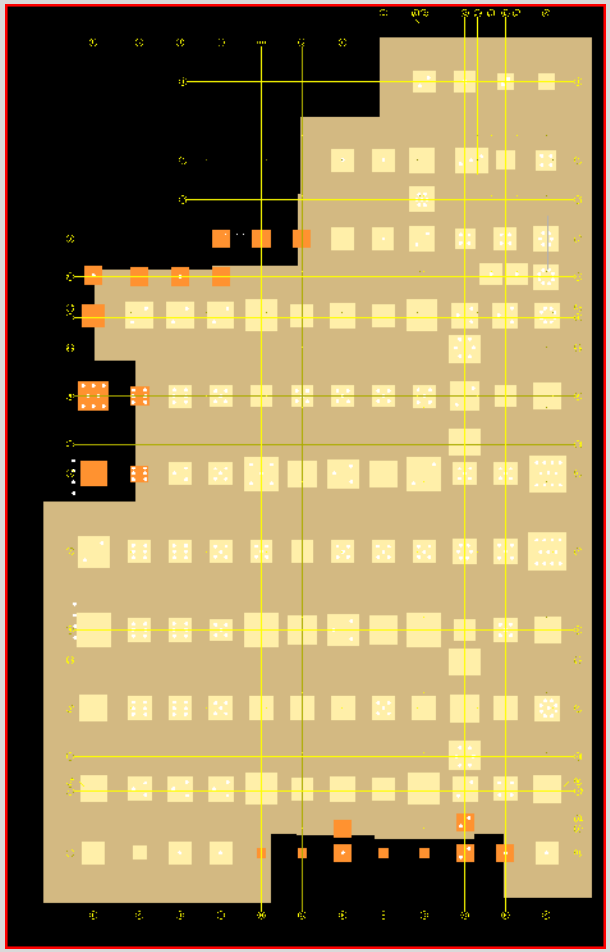




Next Step: Subcontractor Coordination Models (Level 400)

Underground, Structure, Zones, Etc. (Hybrid of Level 200, 300 and 400 Models)



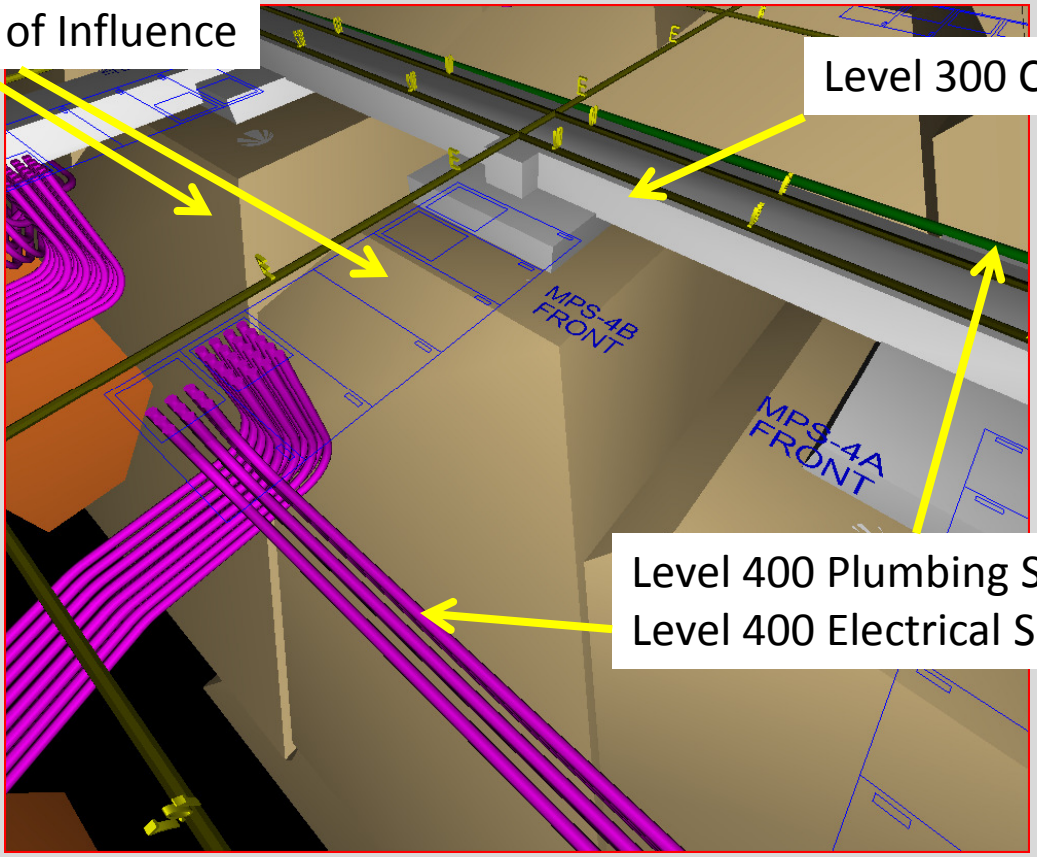


Summary of Levels, Apps, Composite Construction Tools

(Hybrid of Level 200, 300 and 400 Models)

Level 200 Zone of Influence

Source: GC
App: ArchiCAD



Level 300 Concrete Model

Source: AE
App: Revit

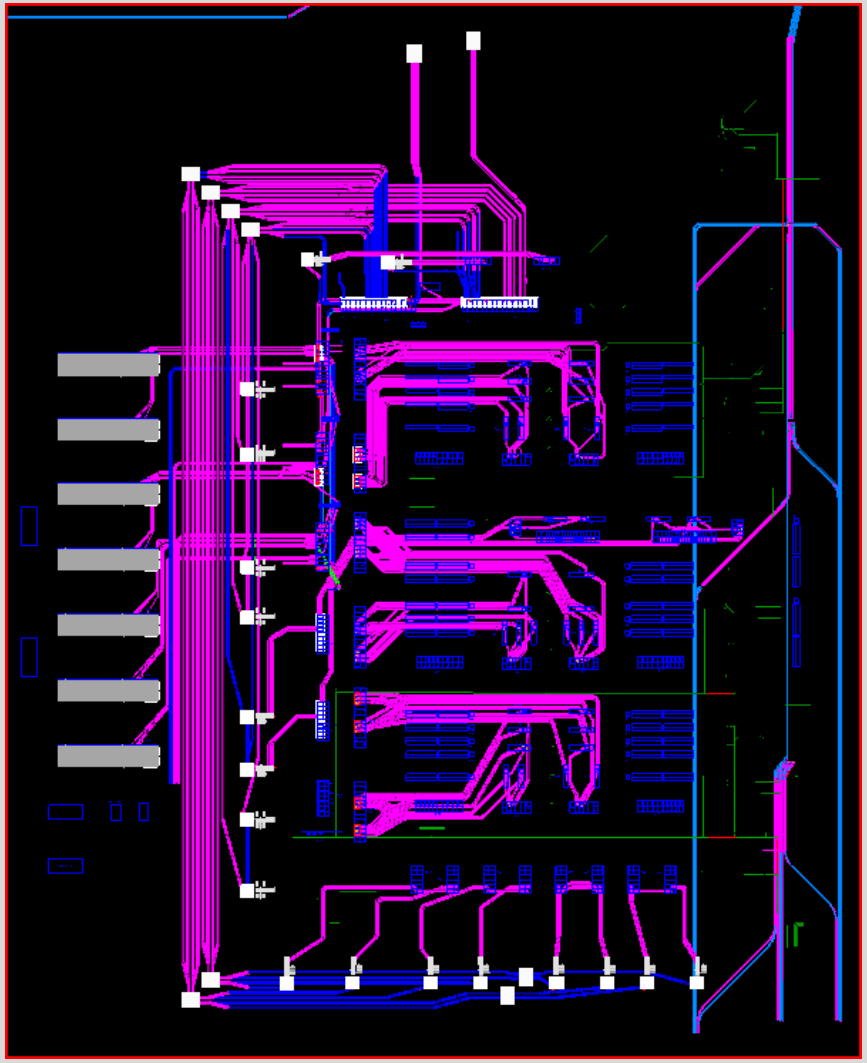
Level 400 Plumbing Shop Drawing
Level 400 Electrical Shop Drawing

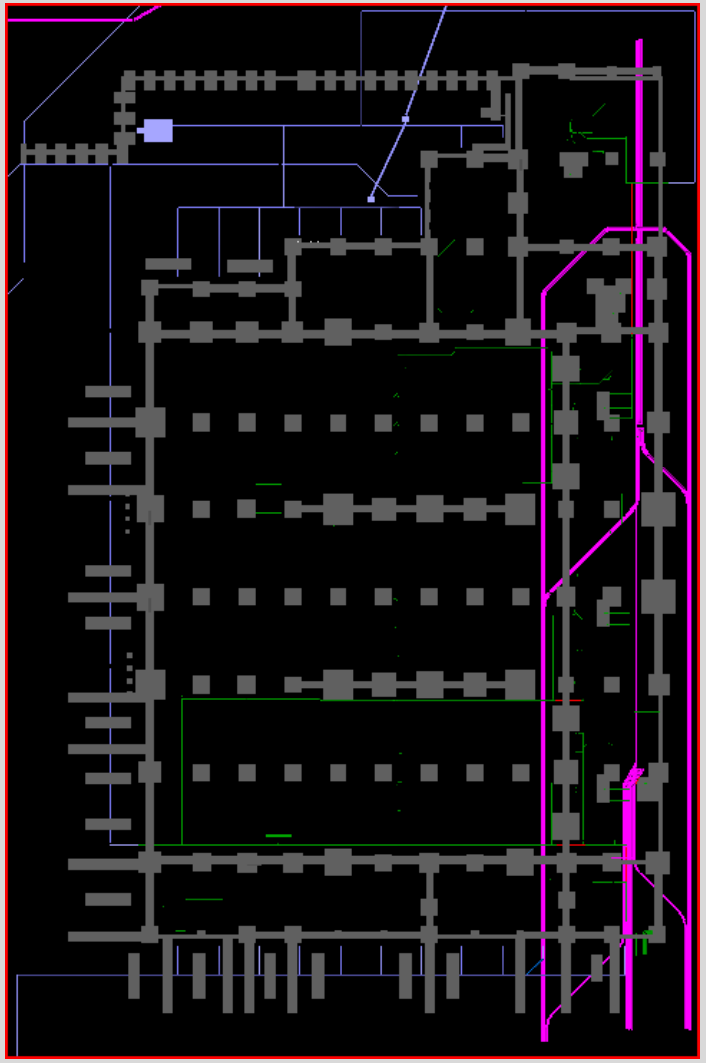
Source: Sub
App: AutoCAD MEP
& Revit MEP

AutoCAD, Revit, Revit Structure, Revit MEP, ArchiCAD, Hyrdacad, CAD Pipe, CAD Duct, AutoCAD MEP models all combined using Navisworks

Underground Electrical, Utility, Plumbing, Concrete (Level 400)

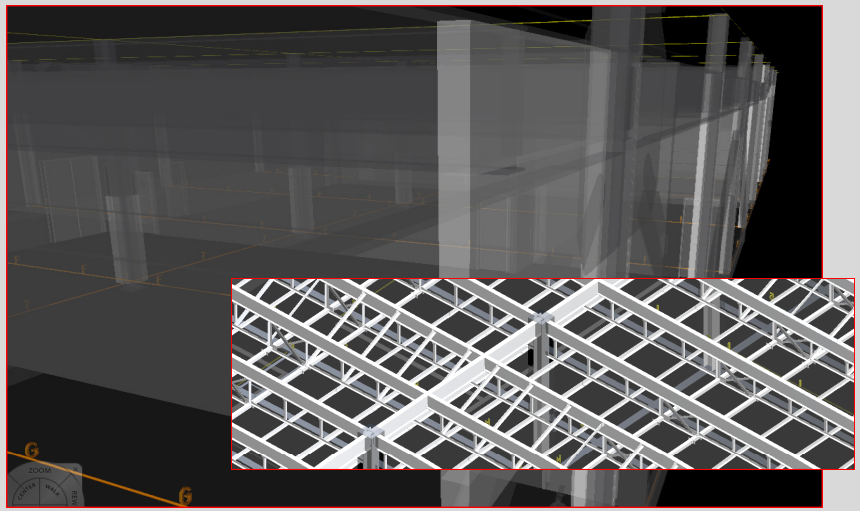
Underground, Structure, Zones, Etc. (Hybrid of Level 200, 300 and 400 Models)



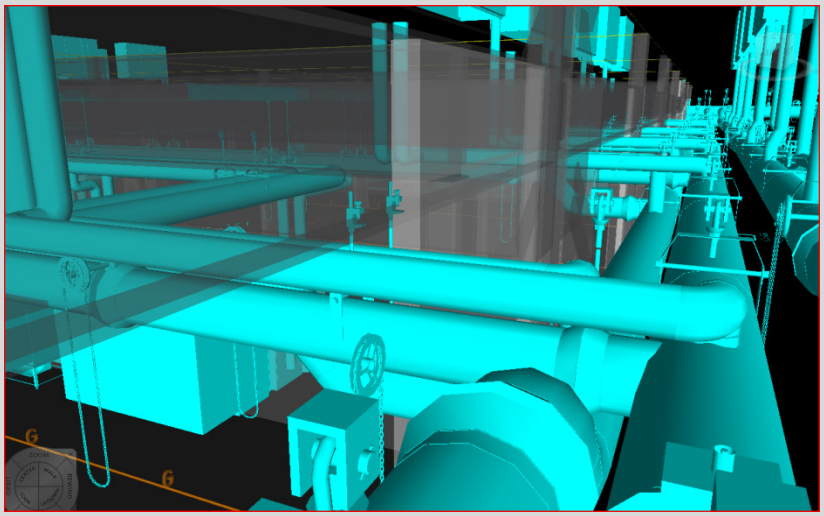


Use of Models that Drive Drawings (Subcontractor Level 400)

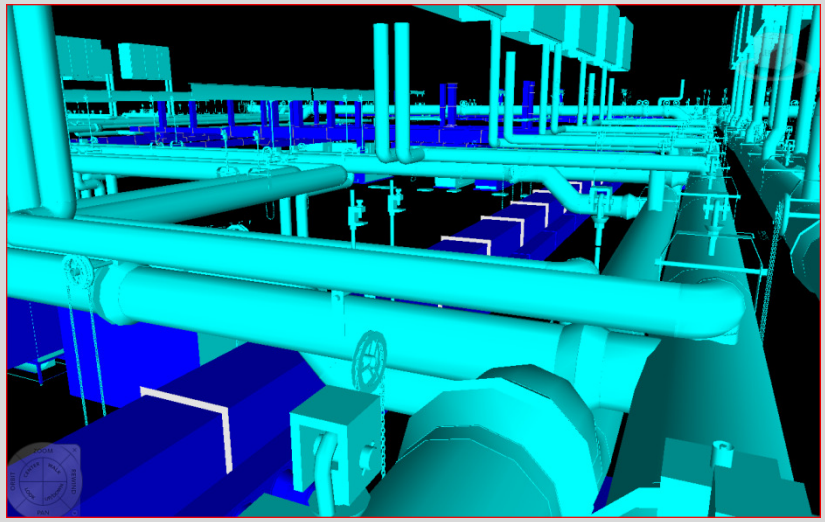
Structural Steel: Tekla and Revit Structure



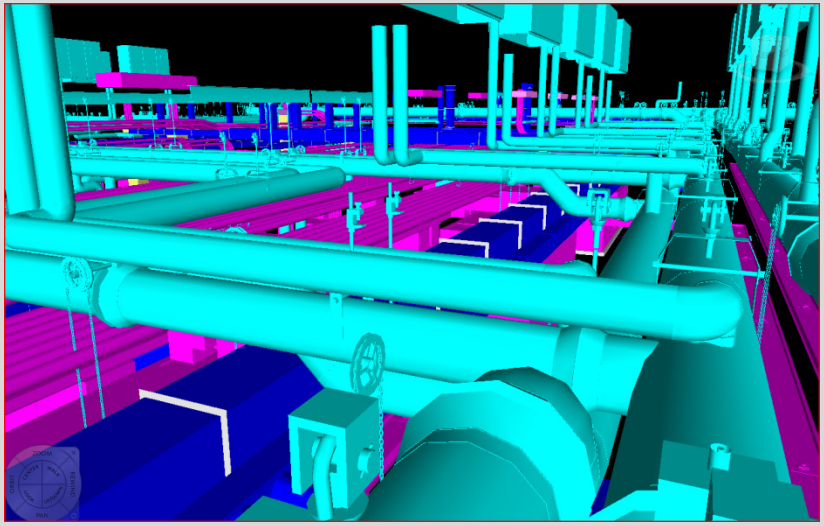
Mechanical Piping: CAD MECH



Mechanical Duct: CAD Duct

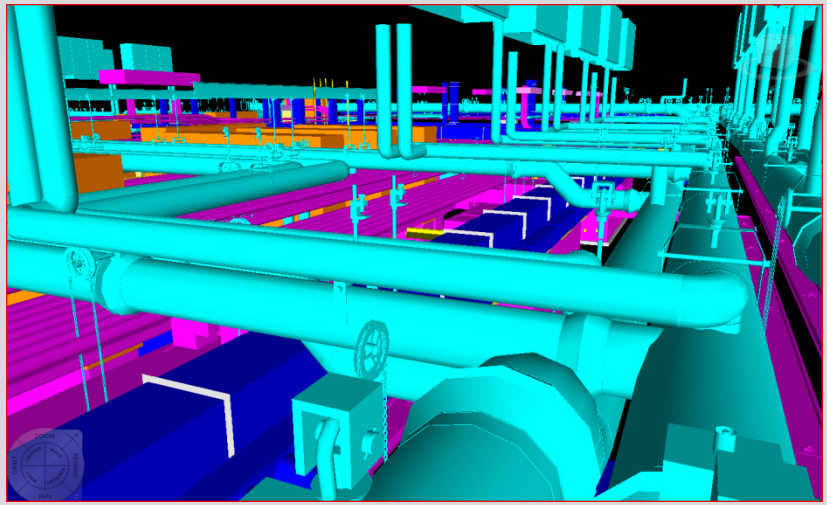


Electrical: AutoCAD MEP

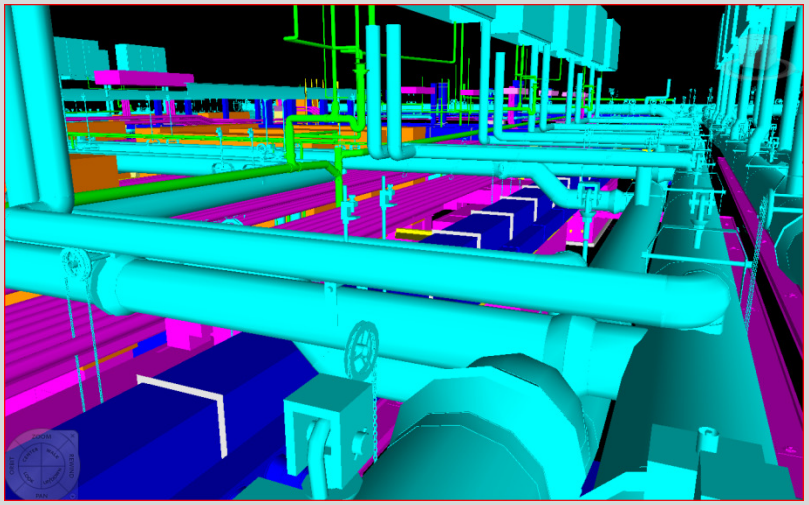


Views: Access Zones, Plumbing, Fire Sprinklers (Level 400)

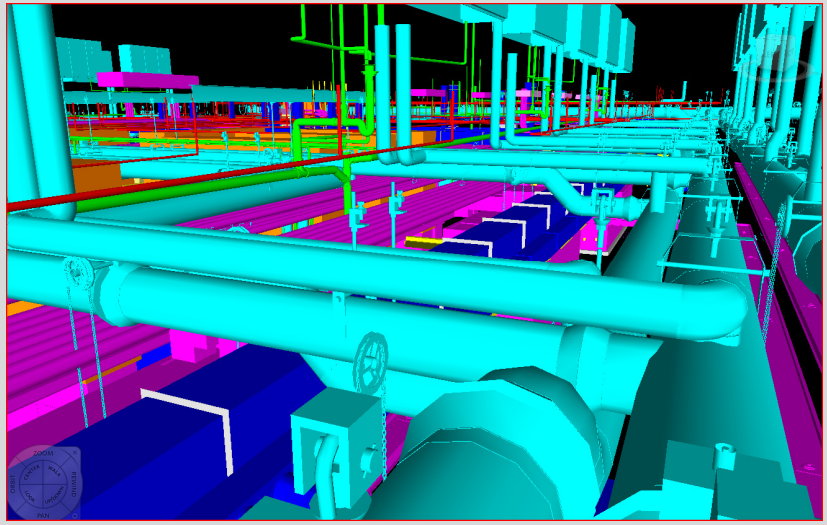
Access Zones: Specific to each Sub



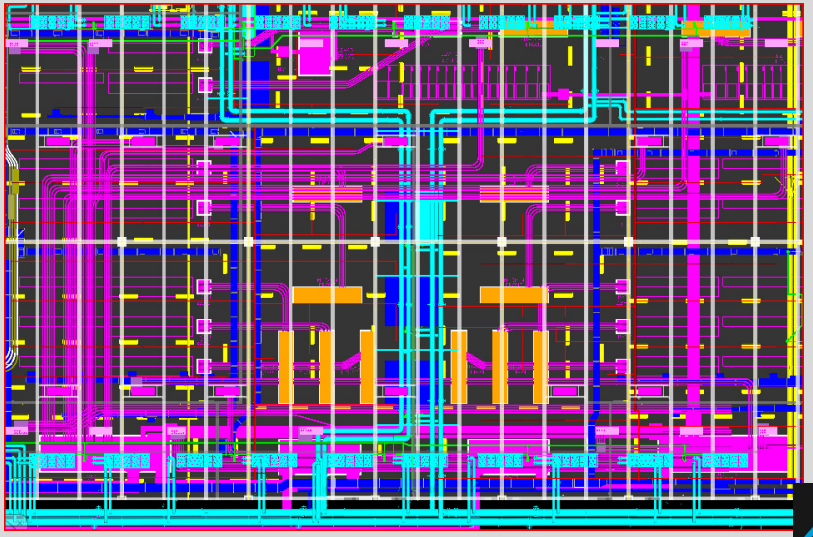
Plumbing: Revit MEP



Fire Sprinklers: Hydra CAD

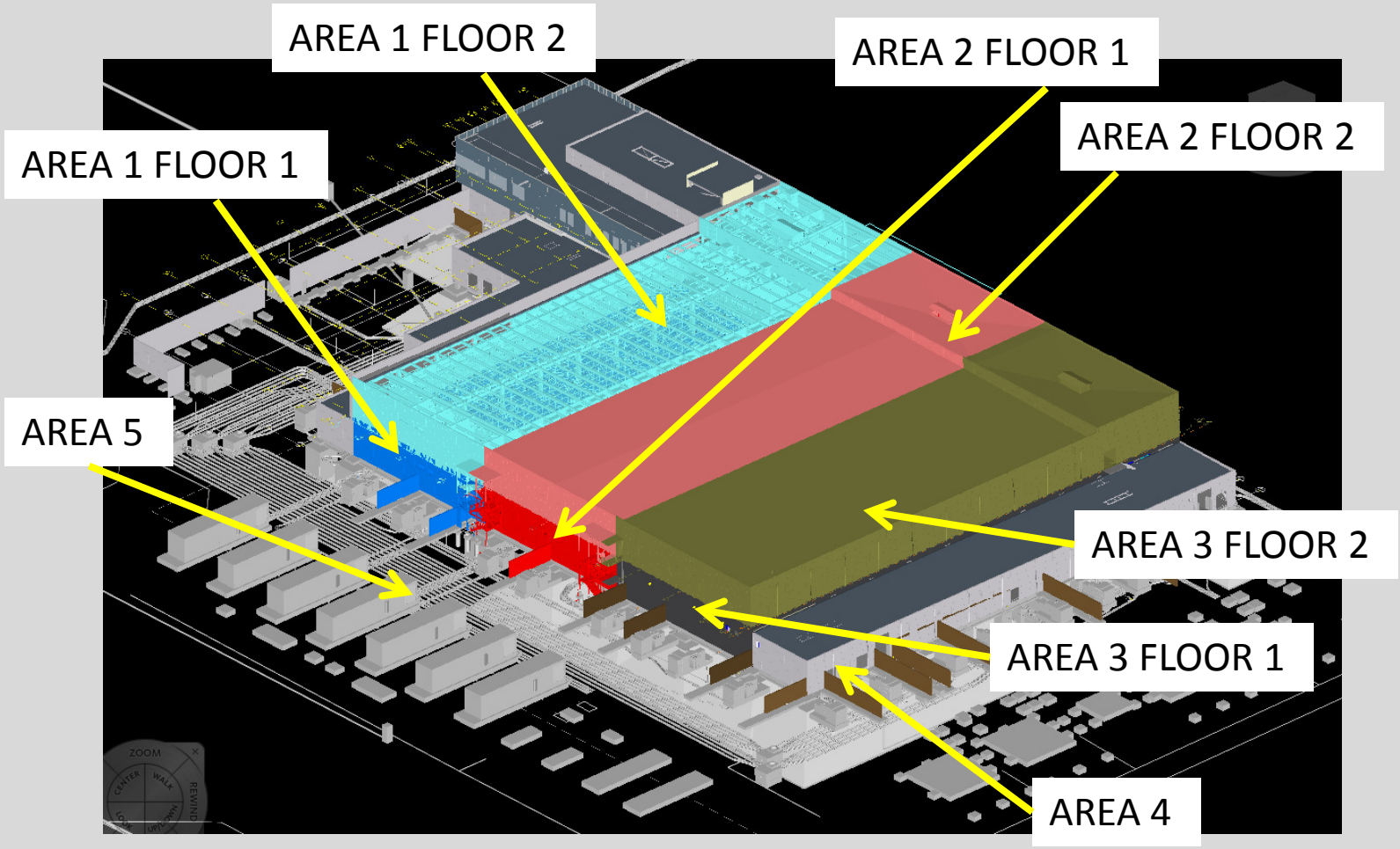


Composite Area 1 Floor Level 1



Model Organization: Critical Task

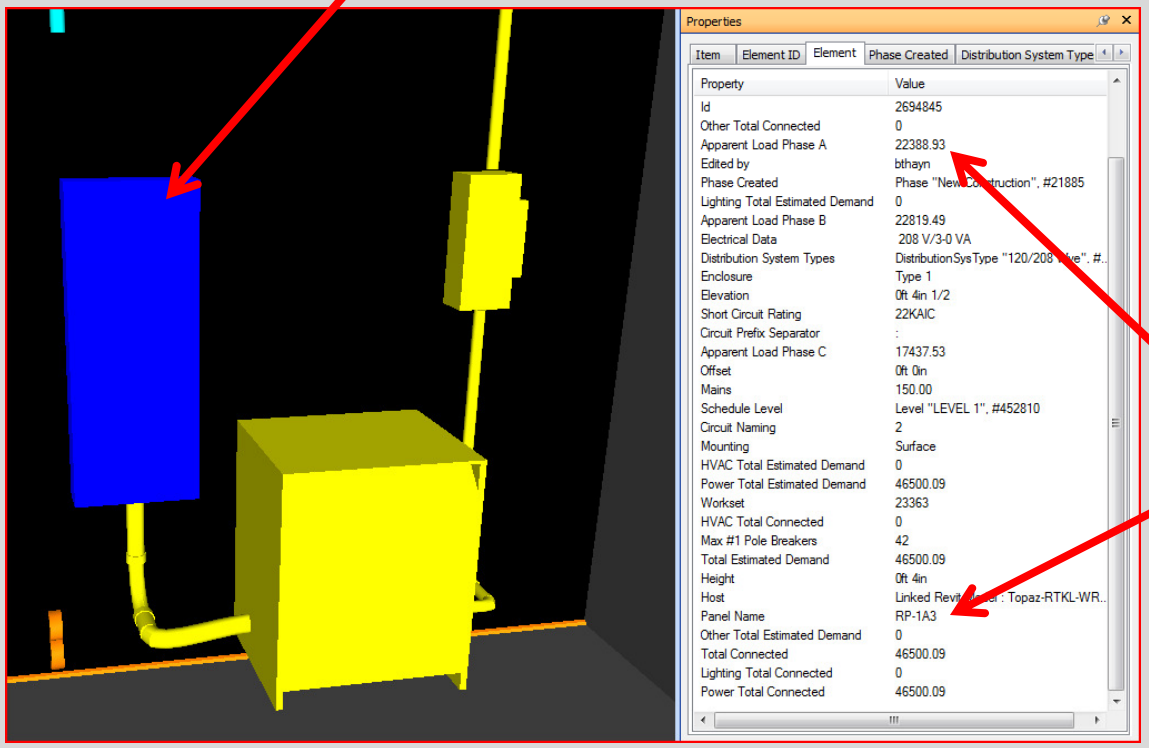
Strict Organization, Common Nomenclature, FTP (Team Site) Data Sharing, Alerts.



Field BIM

Leveraging new Tools and Existing Data Sets

Single Object Selected

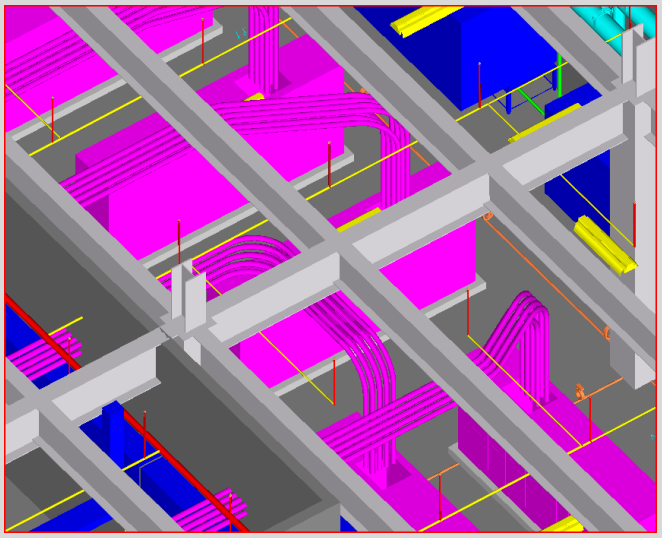


Nearly Endless levels of Data can be pulled from the Design File. Custom Properties, Attributes, IDs, Serial Numbers, Etc.

Field BIM

Leveraging new Tools and Existing Data Sets

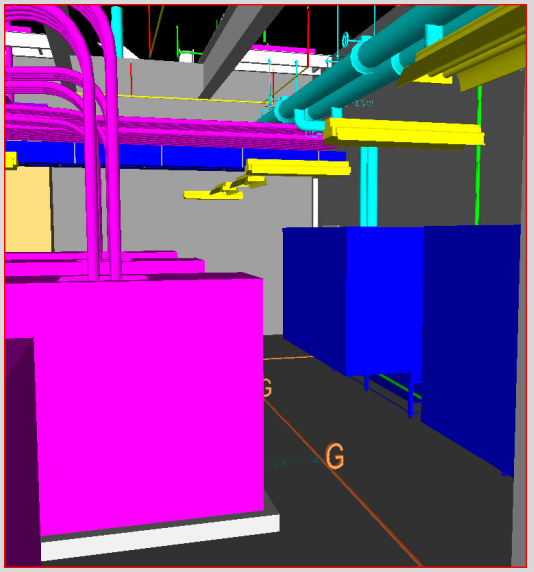
Field BIM software automates the execution and
oversight of field activities for Contractors and Owners.
Instead of carrying a field notebook and paper plans or specs, jobsite users work with Field BIM software on mobile computers to electronically access documents and to complete field reports, QA/QC and safety inspections, punchlists, update the BIM (Building Information Models) and many other critical field activities. Management users access field information on any computer in near real time as it is completed, to
improve decision making.



Field BIM

Leveraging new Tools and Existing Data Sets

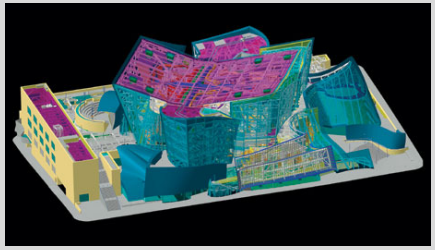
Model Data in the Office and In the Field.

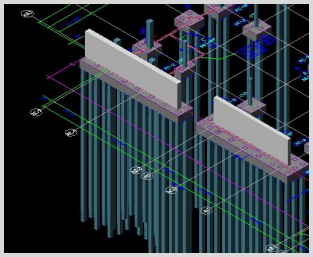


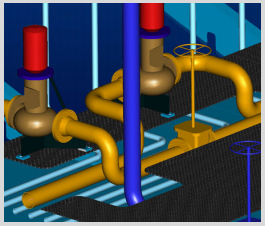
The results. Field BIM systems provide jobsite personnel with better tools to deliver the project faster and gives management instant information to manage quality, personnel performance and reduce risk.

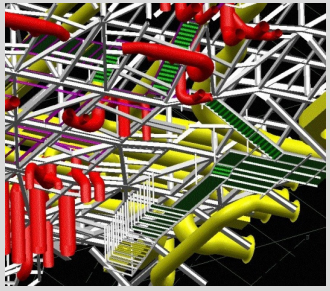
Where BIM proved to be Valuable

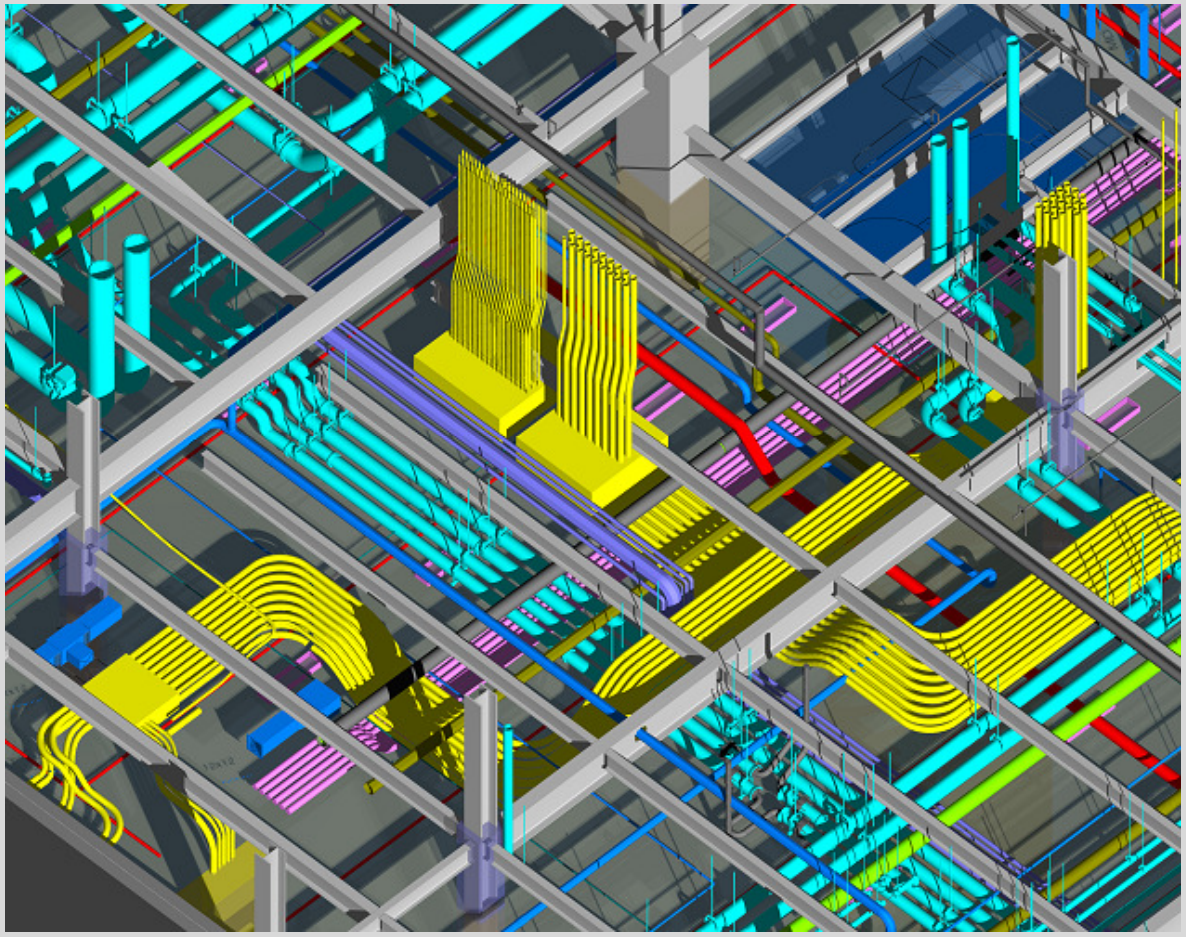
A Better Way to Build, Metrics and Moving Forward







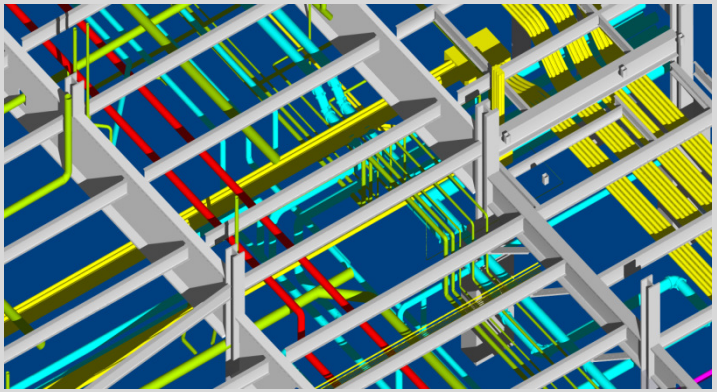




Where BIM proved to be Valuable

Metrics

Current Project Metrics: City Creek Transfer Deck | Block 76, Salt Lake City, Utah



General Contractor Data:

Total Congested Area: 300,000 SF

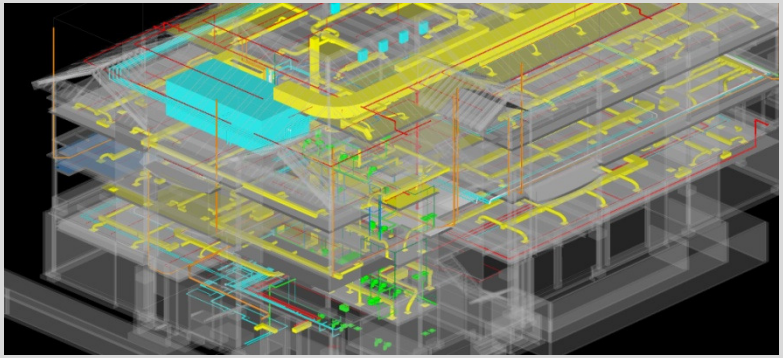
3D MEP BIM Effort Duration: 6 Months

Major Conflicts/Clashes Corrected: 1500+

3D BIM Cost: $125,000

ROI of BIM Effort: $2,500,000 (Approx 20x) *Best to Date

Project Metrics: Snow College Library, Ephraim, Utah



Subcontractor Data:

Project Area: 71,000 SF

3D MEP BIM Effort Duration: 3 Months

Major Conflicts/Clashes Corrected: 900+, Main Floor Ceiling Space compressed by 1 FT

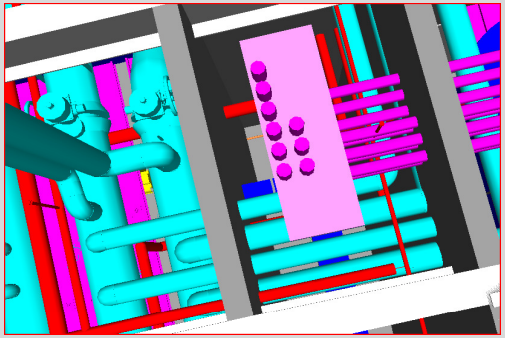
3D BIM Cost: $12,000

ROI of BIM Effort: $48,000 (Approx 4x) *Average

Lessons Learned

Use the Tools Available, Communication Fundamentals Still Apply

Subcontractors Need to use the Tools and Leverage Them



Tools:

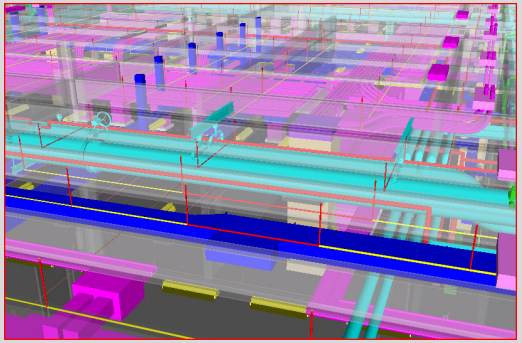
CAD: Pull Data Together That is Available

Navisworks: Internal Clash Checks

Human Eye: Don’t Use Technology as a Crutch

Follow Up: Phone Calls, Limit Email

The Power of Follow-Up



Communication:

Hierarchy: Supers Must Be Involved

Weekly or 2X Week Mtgs: Room Full of Supers is the best Mtg

Working Sessions: Go onsite, face to face, GoTo Mtgs.

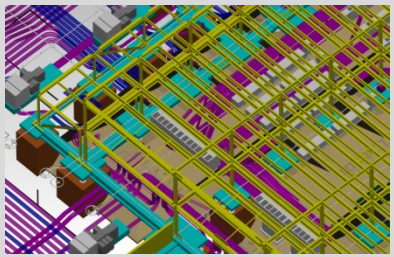
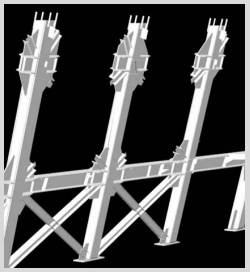
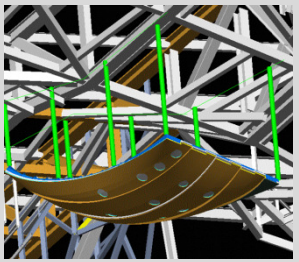
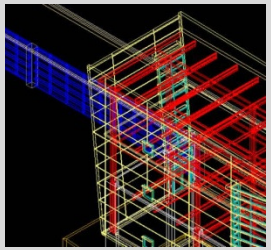
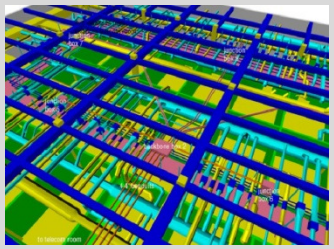
Plan: Think Long Term…Invest in your employees and subs.

Technology: 3D has proven itself everywhere.

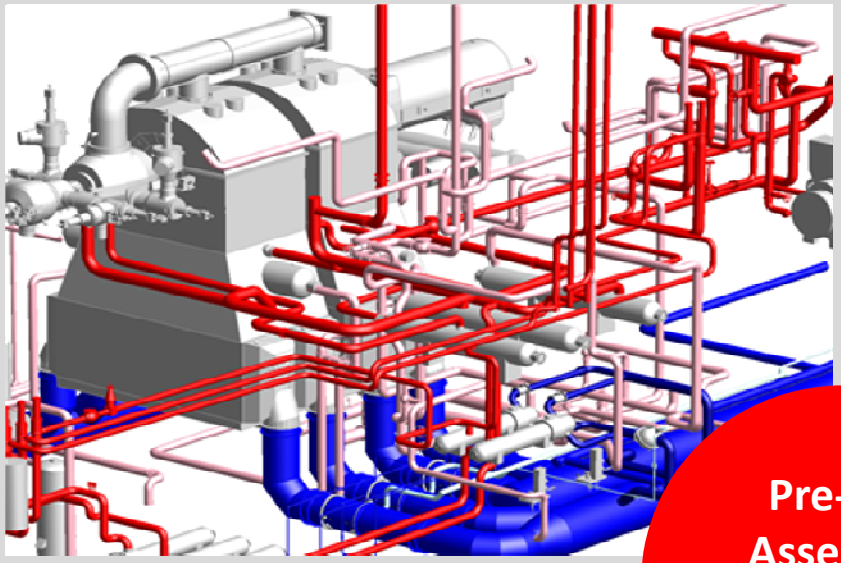
Moving Forward

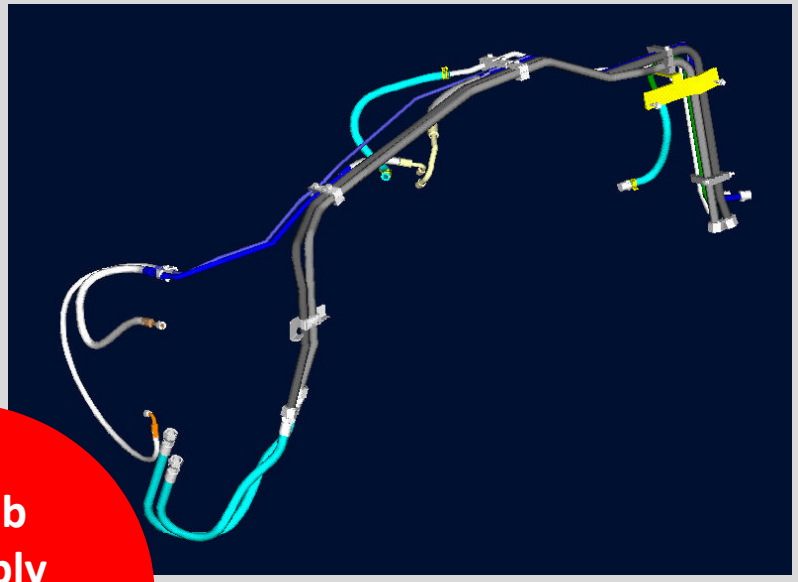
What's Next…& Research Areas

- Better, Faster Clash Detection and Clash Resolution.
- Data Extraction from Highly Detailed Models. We want to see usable Data pulled from the model and sent to a Total Station for field layout.
- Lots of room for innovation and new software technologies & Delivery Systems—Model in Tandem.
- 4D modeling and scheduling tools and approach.
- Hybrid 5D Estimating with 2D/3D/Data Set Overlay. Very possible…just needs tools and resources…and experience.

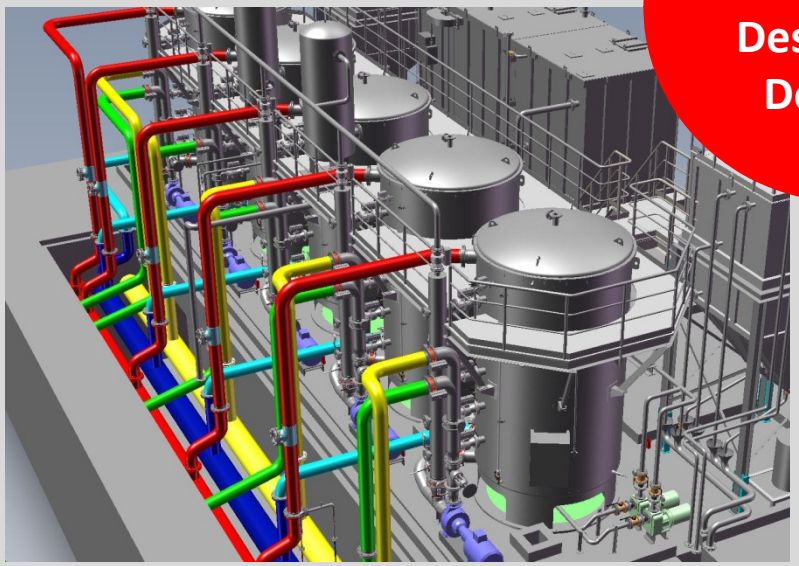






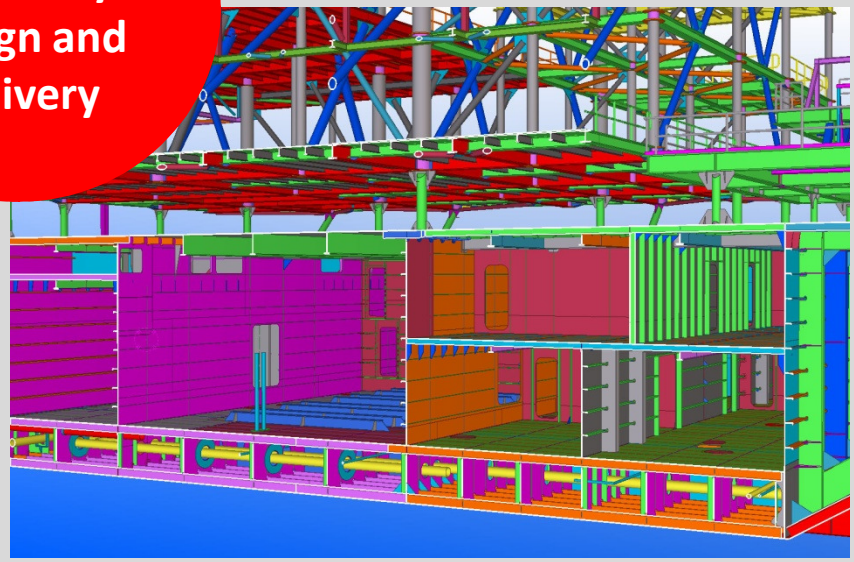
The World of 3D PreFab is next…





Pre-Fab Assembly Design and Delivery





---Next Slides---BIM Implementation

Implementation

Outsourcing (An Excellent Tool)

- Time Constraints may dictate your ability.
  - 3D/4D Modeling Efforts Typically get the go ahead late in the game.
- On Fast Track projects we can act as an extension of your core project management team.
  - Some projects may only need 8-10 hrs/wk for MEP coordination. Others may require full time staff.
- Training
  - More than meets the eye. Experience in Critical.
- Software, Hardware tools can be expensive.
- Call us anytime with Questions. We're glad to help.

Implementation

Hybrid Approach

- Get BIM support and side by side training on your first project.
  - You'll be surprised what your CAD guy can do with a couple hours of training and a license of Navisworks on your next project.
- Best Place to Start?
  - MEP Coordination will pay you back fast. And, its fairly straightforward.
  - Phasing, Scheduling and using the 4D tools are a good second effort area.
  - Presentation, Marketing, Reports, etc.
  - 5D Cost Modeling. Begin testing the water.
- Check with your subs. Shop drawings are often generated from a 3D solid modeling application. Use the available data and models.
- Hybrid 3D Estimating with 2D/Data Set Overlay. Very possible…just needs tools and resources…and experience.
- Share a Mid-Size Contractor's Phone Call on where to get started…